Glenn Research Center

PHaSE Results Summary

The Physics of Hard Spheres Experiment (PHaSE) detected (static and light scattering) the structure, dynamics, and other properties associated with the disorder-order transition in hard sphere colloidal dispersions. During STS–94 substantial quantitative microgravity data was gathered which better defines several features of the transition:

- Growing colloidal crystallites are intially compressed by the metastable fluid, but relax toward their equilibrium structure as growth proceeds.

- Randomly stacked hexagonal planes dominate the structure initially, with a face-centered-cubic (fcc) component which emerges during the long term. This suggests that the fcc structure is the equilibrium structure.

Since the Bragg scattering images contain features never before seen under 1g conditions, further detailed analysis is needed to extract additional information about the growth process. Although interpretation of this data is complex and time consuming, this information will eventually enable the production of unique colloidal materials.